# Table of Contents

## Introduction

Case 1:
Patient Blood Management Considerations in an Orthopedic Surgery Patient

Stephen Walsh, MD

Objectives

Case Scenario

How Should This Patient’s Anemia Be Managed?

Is There a Role for ESAs in the Management of This Patient?

Should the Presence of Diabetes Influence the Management of This Patient?

What Intraoperative Strategies Should Be Considered?

Is There a Role for Preoperative Autologous Donation Before Elective Joint Replacement Surgery?

How Should the Patient Be Managed in the Postoperative Period?

What Is the Expected Rate of Transfusion in Uncomplicated Primary Elective Hip Replacement Using Patient Blood Management Treatment Strategies?

Key Learning Points

References

Case 2:
Patient Blood Management in a Cardiovascular Surgery Patient

Tonya de Waal, MD, and Marianne de Bretan-Berg, RN, CFRN

Objectives

Case Scenario

What Concerns Are Raised About This Patient Anticipating Hip Arthroplasty?

What Is the Prevalence of Anemia in Cardiac Surgery?

What Are the Risks Associated with Preoperative Anemia?

What Is the Likelihood of Transfusion and What Is the “Downside” of Transfusion in This Setting?

What Preoperative Assessment Should Be Performed?

What Additional Laboratory Tests Should Be Ordered for This Patient?

Should the TRUST Score Affect the Management of This Patient?
Should ESAs Be Given? ............................................................... 15
What Operative Strategies Should Be Considered? .................. 16
Key Learning Points ................................................................. 19
References .............................................................................. 19

Case 3:
Management of an Anemic Obstetric Patient ....................... 21

Jed B. Gorlin, MD, MBA, and Evelyn L. Lockhart, MD

Objectives ............................................................................... 21
Case Scenario ........................................................................... 21
Anemia in Pregnancy ................................................................. 22
Does Oral Iron Help in Pregnancy? ........................................ 23
Obstetric Hemorrhage: Definition, Epidemiology, and Risk Factors ... 24
After the Hemorrhage Is Controlled ........................................ 36
Key Learning Points ................................................................. 36
References .............................................................................. 37

Case 4:
Management of a Gynecologic Oncology Patient Requiring Surgery .... 41

Nimesh P. Nagarsheth, MD

Objectives ............................................................................... 41
Case Scenario ........................................................................... 41
Case Discussion ........................................................................ 41
What Preoperative Care Measures Should Be Undertaken? .......... 42
What Are the Surgical Approach Considerations? .................... 43
Does Use of an ESA in a Patient with Cancer and a Hemoglobin Level of 9.2 g/dL Pose Any Concern? ......................... 44
Does Transfusion Pose a Particular Risk for Patients with Malignancy? ........................................................... 45
What Are the Intraoperative Considerations? ........................... 46
What Are the Components of Postoperative Care That Should Be Considered? ......................................................... 47
Key Learning Points ................................................................. 48
References .............................................................................. 48

Case 5:
Patient Blood Management in a Hematology/Oncology Patient .... 51

Patricia A. Ford, MD, and Vasundhara Singh, MD

Objectives ............................................................................... 51
Case Scenario ........................................................................... 51
What Are the Main Concerns for Initial Hematologic Management for This Patient? ......................................................... 52
What Is the Incidence of Anemia in Cancer? ................................. 52
What Are the Benefits and Risks of Transfusion? ......................... 52
What Is the Appropriate Red Cell Transfusion Threshold for
This Patient? ........................................................................ 53
Restrictive vs Liberal Transfusion Therapy .................................. 53
What Other Strategies Should Be Considered When Managing
This Patient? ........................................................................ 54
What Medical Strategies Can Be Used to Manage This Patient’s
Anemia Once the Bleeding Is Controlled? ................................. 55
What Is an Appropriate Prophylactic Platelet Transfusion Threshold
in This Patient? ........................................................................ 57
What Treatment Is Recommended if the Patient Were to Develop
Worsening Hemoptysis and Potential for Pulmonary Hemorrhage? 58
Therapies of Consideration ...................................................... 59
Key Learning Points ............................................................... 60
References .............................................................................. 60

Case 6: Management of a Jehovah’s Witness Patient ................. 63

Margit Kaufman, MD, and Sherri Ozawa, RN

Objectives .............................................................................. 63
Case Scenario .......................................................................... 63
What Is the Basis for the Belief System to Which Jehovah’s Witness
Patients Ascribe Their View on Blood Component Transfusion? .... 64
What Are the Principles of Patient Self-Determination and
Autonomy? How Can This Patient Make Informed Decisions
Regarding His Care? .............................................................. 64
What Types of Conversations and Discussions Should Take Place
with a Jehovah’s Witness Patient in Both Elective and Emergent
Situations? Are There Resources to Help the Patient and the
Health-Care Provider Caring for a Jehovah’s Witness? .............. 66
What Type of Additional Documentation of the Patient’s Preferences
Should Be Completed by Caregivers? Are There Specific Concerns
with an Incapacitated Adult Patient? ....................................... 68
What Initial Steps Can the Provider Take to Stabilize the Patient?
How Can the Health-Care Provider Physiologically Optimize the
Patient to Tolerate Severe Anemia? ........................................ 68
What Are the Next Steps in the Patient’s Care Now That There Is
No Active Bleeding, but the Patient Is Still Intubated with Altered
Mental Status? ..................................................................... 70
The Patient Is Having Some Occasional Episodes of Hypotension
with Mean Arterial Pressures Between 55 and 60 mmHg. What
Management Options Are Appropriate? .................................. 70
What Additional Steps in the Management of the Severely Anemic Jehovah’s Witness Patient Can the ICU Team Initiate? ............ 71
What Are Hemoglobin-Based Oxygen Carriers and Would They Be Indicated in This Case? .................................................. 72
What Additional Steps Can the ICU Team Take to Optimize Recovery of the Patient? ...................................................... 73
What Additional Risks Does This Patient Face During His Recovery? ... 75
Although Phlebotomy and Laboratory Tests Are Part of Routine Care of Critically Ill Patients, What Options Are There to Prevent Additional Anemia Caused by Excessive Laboratory Work? ........... 75
Key Learning Points ................................................................. 76
References ............................................................................. 77

Case 7:
Management of Bleeding in the Setting of Target-Specific Oral Anticoagulants ................................................................. 79

Yulia Lin, MD, FRCPC, and Katerina Pavenski, MD, FRCPC

Objectives ................................................................. 79
Case Scenario ............................................................ 80
What Is the Mechanism of Action of TSOACs? ....................... 80
What Are the Indications for TSOACs? ................................. 80
What Is the Risk of Bleeding with TSOACs Compared with Warfarin? . 81
What Factors Increase the Risk of Bleeding with TSOACs? ........ 82
What Coagulation Testing Can Be Performed to Help with the Management of This Patient? ........................................... 84
What General Measures Should Be Employed for This Bleeding Patient? .............................................................. 85
In the Setting of Severe or Life-Threatening Bleeding, What Reversal Strategies Can Be Considered for This Patient? ........... 87
Key Learning Points ................................................................. 88
References ............................................................................. 88

Case 8:
Management of Bleeding in the Setting of Antiplatelet Drugs ........ 91

Katerina Pavenski, MD, FRCPC, and Yulia Lin, MD, FRCPC

Objectives ................................................................. 91
Case Scenario ............................................................ 91
Immediate Patient Management .............................................. 92
What Laboratory Investigations May Help Guide Further Management of This Patient? ...................................................... 92
What Is the Patient’s Hemostatic Defect? ................................. 93
What Is the Mechanism of Action of Aspirin, Clopidogrel, and Eptifibatide? How Long Do the Effects of These Drugs Persist After Their Administration? ................................................................. 93
What Is the Most Appropriate Management of the Patient’s Hemostatic Defect? ................................................................. 94
What Are the Risks of a Platelet Transfusion? Are There Alternative Approaches That Might Be Useful for This Patient? ............... 95
What Are the Alternatives to Platelet Transfusion in This Context? ... 96
What Patient Blood Management Strategies Could Be Used to Improve Tolerance of Anemia? ......................................................... 97
What Should the Red Blood Cell Transfusion Threshold Be for This Patient? ................................................................. 98
Key Learning Points ........................................................................... 98
References ......................................................................................... 98

Case 9:
Strategies for Warfarin Reversal in the Hemorrhaging Patient ........ 101

Joseph Sweeney, MD, FACP, FRCPath

Objectives ................................................................. 101
Case Scenario ................................................................. 101
What Are the Main Concerns Regarding This Patient Upon Presentation? ................................................................. 101
What Is the Bleeding Risk of Endoscopy in Patients Taking Warfarin? ................................................................. 102
What Is the Mechanism of Action of Warfarin? ......................... 103
How Can Reversal of Warfarin Be Achieved? ............................ 103
What Other Aspects of Clinical Management Need to Be Considered Regarding This Patient? ................................................................. 108
Is There a Risk of Thrombosis After Warfarin Reversal? ............ 109
How Urgently Should the Endoscopy Be Performed? ................. 109
Key Learning Points ................................................................. 110
References ......................................................................................... 110

Case 10:
Management of Anemia in a Critically Ill Patient ...................... 113

Howard L. Corwin, MD, FCCM

Objectives ................................................................. 113
Case Scenario ................................................................. 113
Are There Aspects of Anemia Particular to Critically Ill Patients? .... 114
What Is the Role of Erythropoietin in the Critically Ill Patient? ...... 115
What Laboratory Abnormalities Are to Be Expected? ............... 115
Is There a Role for Red Blood Cell Transfusion in Critically Ill Patients? ................................................................. 116